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RESEARCH ARTICLE

PATH RELATED EXTENDED MEAN CORDIAL GRAPHS

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ABSTRACT

Let G = (V,E) be a graph with p vertices and q edges. A Extended Mean Cordial Labeling of a Graph G with vertex set V is a bijection from V to {0, 1,2} such that each edge uv is assigned the label $(\lceil f(u) + f(v))\rceil/2$ where ⌈ x ⌉ is the least integer greater than or equal to x with the condition that the number of vertices labeled with 0 and the number of vertices labeled with 1 differ by at most 1 and the number of edges labeled with 0 and the number of edges labeled with 1 differ by at most 1. The graph that admits a Extended Mean Cordial Labeling is called Extended Mean Cordial Graph. In this paper, we proved that Path related graphs P_n^2, P_n, $P_n \Theta P_2$, P_n: S_m, S (P_N) are Extended Mean Cordial Graphs.

INTRODUCTION

A graph G is a finite nonempty set of objects called vertices together with a set of unordered pairs of distinct vertices of G which is called edges. Each pair e = {u,v} of vertices in E is called edges or a line of G. In this paper, we proved that Path related graphs P_n^2, P_n, $P_n \Theta P_2$, P_n: S_m ,S(P_N) are Extended mean Cordial Graphs. For graph theory terminology, we follow [2].

PRELIMINARIES

Let G = (V,E) be a graph with p vertices and q edges. A Extended Mean Cordial Labeling of a Graph G with vertex set V is a bijection from V to {0, 1,2} such that each edge uv is assigned the label $(\lceil f(u) + f(v))\rceil/2$where ⌈ x ⌉ is the least integer greater than or equal to x with the condition that the number of vertices labeled with 0 and the number of vertices labeled with 1 differ by at most 1 and the number of edges labeled with 0 and the number of edges labeled with 1 differ by at most 1.

The graph that admits a Extended Mean Cordial Labeling is calle Extended Mean Cordial Graph. In this paper, we proved that Path related graphs P_n^2, P_n, $P_n \Theta P_2$, P_n: S_m ,S(P_N) are Extended Mean Cordial Graphs.

Definition: 2.1

P_n Graph with sequence of n vertices, and adjacent vertices are joined with an edge P_n is a path of length n-1.

Definition: 2.2

[P_n: S_2] is a graph obtained from a path P_n by joining every vertex of a path to a root of a star S_2 by an edge.

Definition: 2.3

$P_n \Theta P_2$ It is a graph obtain from a path P_n by joined one end of P_2 with each vertices of P_n.

Definition: 2.4

For a graph G the splitting graph s' of G is obtained by adding a new vertex v' corresponding to each vertex v of G such that N(v)= N(v').

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RESULTS

Theorem: 3.1

Graph P_n^2 is a Extended Mean Cordial Graph.

Proof:

Let V (P_n^2) = {[u_i: $1 \leq i \leq n$]

Let E (P_n^2) = {[(u_iu_{i+1}): $1 \leq i \leq n-1$] U [(u_iu_{i+2}): $1 \leq i \leq n-2$]}

Define f: V (P_n^2) → {0, 1, 2}

The vertex labeling are,

$$f(u_i) = \begin{cases} 1 & i \equiv 1\, mod\, 4 \\ 2 & i \equiv 2\, mod\, 4 \\ 0 & i \equiv 0{,}3\, mod\, 4 \end{cases}, 1 \leq i \leq n$$

The edge labeling are,

$$f^*[(u_iu_{i+1})] = \begin{cases} 1 & i \equiv 1{,}2\, mod\, 4 \\ 0 & i \equiv 3{,}0\, mod\, 4 \end{cases}, 1 \leq i \leq n-1$$

$$f^*[(u_iu_{i+2})] = \begin{cases} 1 & i \equiv 1\, mod\, 4 \\ 0 & i \equiv 0\, mod\, 4 \end{cases}, 1 \leq i \leq n-2$$

Here, ef (1) = ef (0) +1

Hence, P_n^2 is Satisfies the condition| ef (0) – ef(1) | ≤ 1. Therefore, P_n^2 is a Extended Mean C ordial Graph.

For example, P_7^2 is a Extended Mean Cordial Graph as shown in the Figure 3.2

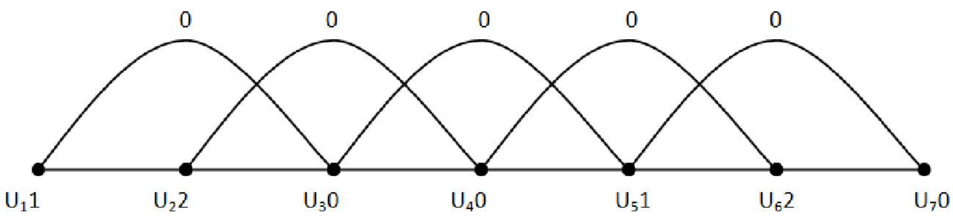

Figure 3.2

Theorem: 3.3

Graph [P_n: S_m] is a Extended Mean Cordial Graph

Proof:

Let V (P_n: S_m) = {[(u_i, v_i) : $1 \leq i \leq n$]U[v_{ij}: $1 \leq i \leq n$, $1 \leq j \leq 3$]}

Let E (P_n: S_m)= {[(u_iu_{i+1}) : $1 \leq i \leq n-1$] U [(u_iv_i) : $1 \leq i \leq n$]U [(v_iv_{ij}):

$1 \leq i \leq n$, $1 \leq j \leq 3$]}

Define f:v (P_n: S_m) →{0,1,2} by

The vertex labeling are,

$$f(u_i) = \begin{cases} 0 & i \equiv 1\, mod\, 2 \\ 1 & i \equiv 0\, mod\, 2 \end{cases}, 1 \leq i \leq n$$

f (v_i)= 1 , $1 \leq i \leq n$

$$f(v_{ij}) = \begin{cases} 0 & i \equiv 1\, mod\, 3 \\ 1 & i \equiv 2{,}0\, mod\, 3 \end{cases}, 1 \leq j \leq 3, 1 \leq i \leq n$$

The edge labeling are,

$f^*(u_iu_{i+1}) = 0$, $1 \le i \le n-1$

$f^*(u_iv_i) = \begin{cases} 0 & i \equiv 1 \bmod 2 \\ 1 & i \equiv 0 \bmod 2 \end{cases}, 1 \le i \le n$

$f^*(v_iv_{ij}) = \begin{cases} 0 & i \equiv 1 \bmod 3 \\ 1 & i \equiv 2,0 \bmod 3 \end{cases}, 1 \le j \le 3, 1 \le i \le n$

Here, ef (1) = ef (0) +1

Hence, P_n: S_m is Satisfies the condition| ef (0) – ef (1) | ≤ 1

Therefore, P_n: S_m is a Extended Mean Cordial Graph.

For example, P_2: S_3 is a Extended Mean Cordial Graph as shown in the Figure 3.4

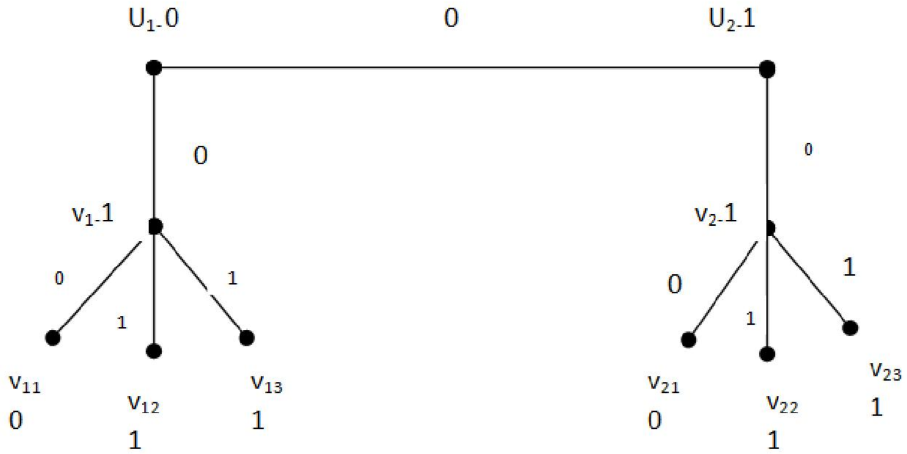

Figure 3.4

Theorem 3.5

Graph $P_n \odot P_2$ is a Extended Mean Cordial Graph.

Proof:

Let G be $P_n \odot P_2$

Let $V[P_n \odot P_2] = \{(v_i): 1 \le i \le n, (u_{i1}, u_{i2}): 1 \le i \le n\}$
Let $E[P_n \odot P_2] = \{[(u_{i1}u_{i2}): 1 \le i \le n] \cup [(v_i v_{i+1}): 1 \le i \le n-1] \cup [(v_i u_{i1}): 1 \le i \le n]\}$

Define f: $V(P_n \odot P_2) \rightarrow \{0,1,2\}$ by

$f(v_i) = \begin{cases} 2 \text{ if } i \equiv 1 \bmod 2 \\ 1 \text{ if } i \equiv 0 \bmod 2 \end{cases}, 1 \le i \le n$

$f(u_{i1}) = 0$, $1 \le i \le n$

$f(u_{i2}) = 0$, $1 \le i \le n$

The induced edge labeling are

$f^*(v_i v_{i+1}) = 1$, $1 \le i \le n-1$

$f^*(u_{i1} u_{i2}) = 0$, $1 \le i \le n$

$f^*(v_i u_{i1}) = \begin{cases} 0 \text{ if } i \equiv 0 \bmod 2 \\ 1 \text{ if } i \equiv 1 \bmod 2 \end{cases}, 1 \le i \le n$

Here the graph satisfies the condition $|e_f(0) - e_f(1)| \le 1$

Hence, $P_n \odot P_2$ is Satisfies the condition| ef (0) – ef (1) | ≤ 1

Therefore, $P_n \odot P_2$ is a Extended Mean Cordial Graph.

For example, $P_3 \odot P_2$ is a Extended Mean Cordial Graph as shown in the Figure3.6

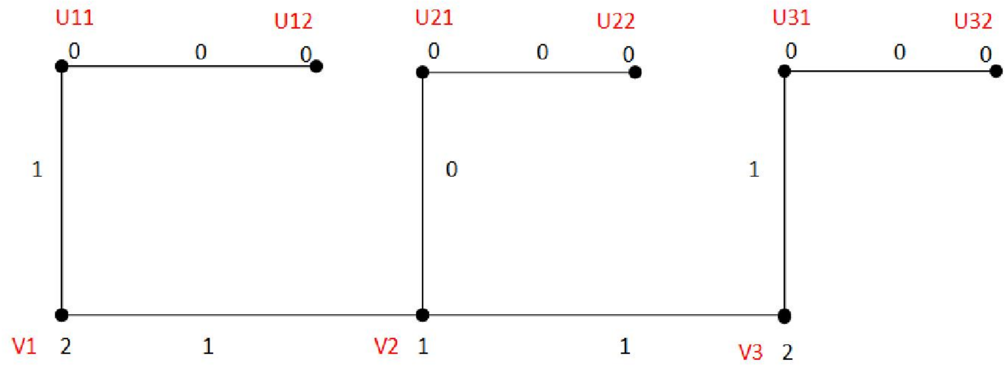

Figure 3.6

Theorem 3.7

Graph S (P_N) is a Extended Mean Cordial Graph

Proof:

Let G be S (P_N)
Let V [S (P_N)] = {u_i, v_i: $1\leq i \leq n$,(w_i):$1\leq i \leq n-1$}
Let E [S (P_N)] = {($u_i u_{i+1}$):$1 \leq i \leq n-1$] ∪ [($v_i v_{i+1}$):$1\leq i\leq n-1$]∪
[($u_i w_i$)∪($v_{i+1} w_i$)∪($v_i w_i$)∪($v_{i+1} w_i$):$1\leq i\leq n-1$]}

Define f: V (G)→{0,1,2} by

f (u_i) =1 $1\leq i\leq n$
f (w_i)=0 $1\leq i\leq n-1$
$f(v_i) = \begin{cases} 2 \ if \ i \equiv 1 mod 2 \\ 0 \ if \ i \equiv 0 mod 2 \end{cases}$, $1\leq i\leq n$

The induced edge labeling are

f * ($u_i u_{i+1}$) =1 , $1\leq i\leq n-1$
f * ($v_i v_{i+1}$) =1 , $1\leq i\leq n-1$
f * ($u_i w_i$) =0 , $1\leq i\leq n-1$
f * ($u_{i+1} w_i$) =0 , $1\leq i\leq n-1$

$f^*(v_i w_i) = \begin{cases} 0 \ if \ i \equiv 0 \ mod \ 2 \\ 1 \ if \ i \equiv 1 \ mod \ 2 \end{cases}$, $1\leq i\leq n-1$

$f^*(v_{i+1} w_i) = \begin{cases} 0 \ if \ i \equiv 1 \ mod \ 2 \\ 1 \ if \ i \equiv 0 \ mod \ 2 \end{cases}$, $1\leq i\leq n-1$

It satisfies the condition

Here $e_f(0) = e_f(1)$ for all n

Hence, S (P_N) is Satisfies the condition$|ef(0) - ef(1)| \leq 1$

Therefore, S (P_N) is a Extended Mean Cordial Graph.

For example, S (P_4) is a Extended Mean Cordial Graph as shown in the figure

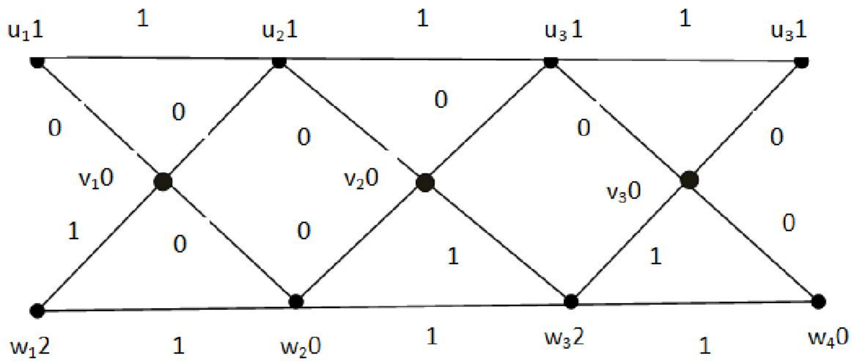

Figure 3.7

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